Department of Energy

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Gentlemen:

The purpose of this correspondence is to address concerns identified by the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA) regarding the Characterization Report for the 903 Drum Storage Area, 903 Lip Area and the Americium Zone (Report) dated September 28, 1999. The agencies received this document on September 30, 1999, and provided written comments on the document to the U.S. Department of Energy (DOE) on January 28, 2000.

Laboratory Practices

The CDPHE and EPA stated that the laboratory practices used in the 903 Pad Area characterization project are highly questionable because quality assurance/quality control (QA/QC) requirements were not met for precision compliance for americum 241 and plutonium 239/240 measurements. It appears that the reviewers may have misinterpreted the field QA/QC results presented in the report for laboratory QA/QC results. The precision compliance statistics referenced in the agency's comments (i.e., 11 percent for plutonium 239/240 and 44 percent for americum 241) represent precision results for field QA/QC samples. The Report presents a qualitative discussion of laboratory QA/QC only.

Field duplicate samples are collected to assess both sampling and measurement precision. As such, field duplicates are expected to have more variability than laboratory duplicates. Field QA/QC samples consisted of nine collocated (duplicate) samples collected at three High Purity Germanium (HPGe) measurement locations. Results from the duplicate samples were compared to the associated real samples by calculating the Duplicate Error Ration (DER), as per Rocky Flats Environmental Technology Site (Site) procedure

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RF/RMRS-98-200, Evaluation of Data for Usability in Final Reports. If the DER exceeded 1.96, the sample was identified as not conforming to precision requirements. However, this comparison is a test of laboratory precision for comparing laboratory duplicate samples to associated real samples rather than quantifying the precision of the field duplicate samples. Laboratory duplicates are quality assurance samples that assess laboratory analytical precision. Laboratory duplicate samples are required to be analyzed at a ten percent frequency or one per analytical batch, whichever is greater. For the 903 Pad characterization, laboratory duplicate sample precision criteria were met for HPGe surface soil samples. The objective of field duplicate samples is provided in the EPA Contract Laboratory Program National Function Guidelines for Inorganic Data Review (EPA, 1994):

> *Field duplicate samples may be taken and analyzed as an indicator of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than lab duplicates which measure only lab performance.*

The EPA guidelines also states that:

> *There are no "required" review criteria for field duplicate comparability.*

The DERs calculated in the Report simply address the question of whether the duplicate and associated real samples are different from each other at the 5 percent level of significance. The calculation is based solely on the precision of the instrumentation (counting error), not total propagated uncertainty. It does not address the uncertainties associated with field sampling. Indeed, based on the relatively low counting error of the instrumentation alone, it should be expected that the DER for two samples collected adjacent to each other would indicate that they are statistically different at the 5 percent level of significance.

The precision compliance criteria presented in the Report were proposed in the Sampling and Analysis Plan because they have been used historically at the Site for radionuclide data. No major surface soil characterization programs have been implemented since the precision requirement for field QA/QC was incorporated into the procedure in 1998. The Report discussed the shortfalls of using laboratory precision requirements for field duplicates; specifically using counting error as the only source of uncertainty.

The Am 241 and Pu 239/240 correlations between soil samples and HPGe measurements were extremely good, with correlation coefficients of 0.99 and 0.97, respectively.

Best Fit Line vs. 95 percent Upper Confidence Limit (UCL) Model Application

Project personnel met with EPA representatives at the Site on August 10, 1999, (CDPHE notified site personnel during the meeting that they would not be represented) to discuss the application of linear models to the HPGe characterization program. Project personnel discussed application of the 95 percent UCL values for Am 241 and Pu 239/240 to individual HPGe measurement locations. The meeting concluded with the agreement that Rocky Mountain Remediation Services (RMRS) would evaluate the 95 percent UCL method further and provide recommendations on its use to the agencies.

On September 10, 1999, Site personnel contacted both EPA and CDPHE project representatives by telephone to report their findings and provide recommendations. The agencies were previously provided maps presenting Tier 1 exceedances based on using the Best Fit Line and 95 percent UCL values for this discussion. After reviewing the correlated data it was determined that the Best-Fit Regression Model was significantly more accurate than the 95 percent UCL regression model. For example, the linear regressions (using the method of least squares) between the alpha spectrometry data (Pu 239/240 and Am 241)and the HPGe data (Am 241) showed high degrees of correlation. The correlation coefficients for Pu 239/240 and Am 241 are greater than or equal to 0.97 for the Best Fit Model. This was expected because the Best Fit Line Model most accurately represents the relationship of the HPGe data to the Alpha Spectrometry data, (i.e., the least squares regression minimizes the variance in the data).

In contrast, UCLs are used to test a hypothesis (Example: "Can a randomly selected paired data point be explained by the linear model?"). The purpose was not to test a hypothesis for 903 Pad data, but rather to develop a model to predict the activities of Am 241 and Pu 239/240 based on HPGe data in the absence of alpha spectrometry data. With regard to accuracy, the 95 percent UCL regression model showed a low degree of correlation between the historical Site surface soil data. Evaluation of the 95 percent UCL model indicates an erroneously high Pu 239/240 and Am 241 ratio and greatly overestimated actinide activities throughout the Americium Zone. A recommendation was made to use the Best Fit Line Am 241 and Pu 239/240 values for the HPGe measurement locations. The agency representatives agreed to the use of the Best Fit Line to present the Rocky Flats Cleanup Agreement action level exceedances, but requested that the 95 percent UCL data be presented in the Report and the associated shortfalls discussed. The Report includes a discussion of using the Best Fit Line and 95 percent UCL models for estimating Am 241 and Pu 239/240.

In summary, based on the validity of the analytical data and the accuracy of the Best Fit Line Model in identifying radionuclide contamination in areas characterized by HPGe surveys, further laboratory and statistical analyses are unnecessary. The DOE, Kaiser-Hill Company, L.L.C., and RMRS staff has scheduled to meet with agency representatives on February 23, 2000, to discuss closure on these issues.
If you should have any further questions on this Report, please contact Norma I. Castaneda at (303) 966-4226 or contact me at (303) 966-5918.

Sincerely,

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for Environment and Infrastructure

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